

CLAIMS

- 2 1. A filter apparatus (10) comprising:
3 (a) tank means (30) for containing a volume of fluid
4 (21);
5 (b) influent means (25, 26) for introducing the fluid
6 (21) into the tank means (30);
7 (c) effluent means (22) for allowing filtered fluid
8 to exit the tank means (30);
9 (d) a filter media (11) for filtering predetermined
10 matter (16) out of the fluid (21);
11 (e) a filter zone (19) in the tank means (30), where
12 the filter media (11) is relatively tightly packed;
13 (f) a mixing zone (18) in the tank means (30) where
14 the filter media (11) is relatively loosely packed;
15 (g) a quiet zone (15) in the tank means (30) adjacent
16 the mixing zone (18), the mixing zone being between the
17 filter zone (19) and the quiet zone (15); and
18 (h) conveyer means (40) for conveying filter media
from the filter zone (19) to the quiet zone (15).
1 2. The apparatus of claim 1, wherein:
2 the filter zone (19) is adjacent the effluent means
(22).
1 3. The apparatus of claim 1, wherein:
2 the mixing zone is between the influent means (25, 26)
and the filter zone (19).
1 4. The apparatus of claim 1, wherein:
the quiet zone (15) is below the mixing zone (18).
1 5. The apparatus of claim 1, wherein:
2 the fluid (21) being filtered is water and the filter
media (11) comprises buoyant beads.
1 6. The apparatus of claim 1, wherein:
2 the conveyer means (40) comprises a screw auger (41),
3 a motor means (45) for turning the screw auger (41),
and a duct means (42) for containing the screw auger (41).
1 7. The apparatus of claim 6, wherein:
2 the influent means includes pipes (125) which secure
the duct means to the wall (131) of the tank means (130).

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1 8. The apparatus of claim 1, wherein:
2 the conveyer means comprises a duct means (442) and
3 pipe means (426) for directing incoming water into the duct
 means.

1 9. The apparatus of claim 1, wherein:
2 the tank means has an open top to allow buoyant filter
3 media to freely rise out of the water when water is being
 filtered.

1 10. The apparatus of claim 1, further comprising:
2 a waste outlet (33) for extracting predetermined
 matter from the quiet zone (15).

1 11. The apparatus of claim 1, wherein:
2 the effluent means comprises:
3 (i) a plurality of effluent pipes (122); and
4 (ii) means for stopping fluid flow out of the tank
5 means through at least one effluent pipe while fluid flows
6 out of the tank means through at least one other effluent
 pipe.

1 12. The apparatus of claim 1, wherein:
 the predetermined matter comprises solid impurities.

1 13. A filter system comprising:

2 (a) tank means (30) for containing a volume of fluid
3 (21);

4 (b) influent means (25, 26) for introducing the fluid
5 (21) into the tank means (30);

6 (c) effluent means (22) for allowing filtered fluid
7 to exit the tank means (30);

8 (d) a filter media (11) for filtering predetermined
9 matter (16) out of the fluid (21);

10 (e) a filter zone (19) in the tank means (30),
11 adjacent the effluent means (22), where the filter media is
12 relatively tightly packed;

13 (f) a mixing zone (18) in the tank means (30) between
14 the influent means (25, 26) and the filter zone (19) where
15 the filter media is relatively loosely packed;

16 (g) a quiet zone (15) in the tank means (30) adjacent
17 and below the mixing zone (18);

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18 (h) conveyer means (40) for conveying filter media
19 from the filter zone (19) to the quiet zone (15);

20 (i) a fish tank (50) for containing live fish and
21 water, the water in the fish tank being the fluid being
filtered in the tank means, and the filter media being
buoyant in the water.

1 14. The system of claim 13, further comprising:

2 a pump (24) for pumping water from the fish tank (50)
~~to the tank means (30).~~

3 ~~15. A method of filtering fluid, comprising the steps~~
4 ~~of:~~

5 (a) providing a tank means (30) for containing a
6 volume of fluid (21);

7 (b) introducing the fluid (21) into the tank means
8 (30);

9 (c) providing a filter media (11) for filtering
10 predetermined matter (16) out of the fluid (21);

11 (d) causing the filter media to pack relatively
12 tightly in a filter zone (19) in the tank means (30);

13 (e) flowing the fluid through the filter zone (19)
14 where predetermined matter (16) in the fluid (21) becomes
15 trapped in the filter media;

16 (f) flowing the filtered fluid out of the tank means
17 (30);

18 (g) conveying the filter media (11) and trapped
19 predetermined matter (16) from the filter zone (19) to a
20 quiet zone (15) where the predetermined matter (16) moves
21 away from the filter zone (19) and the filter media (11)
22 move in the direction of the filter zone (19); and

23 (h) allowing the filter media (11) to move from the
quiet zone (15) to a mixing zone (18) where the filter
media (11) mixes with predetermined matter (16) in the
fluid (21) being filtered.

1 16. The method of claim 15, wherein:

2 the filter media (11) and trapped predetermined matter
3 (16) are continuously conveyed from the filter zone (19) to
the quiet zone (15) while fluid is being filtered.

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Suba 1 17. The method of claim 15, wherein:
2 the trapped predetermined matter (16) drops to the
bottom of the tank means (30) in the quiet zone (15).

1 18. The method of claim 15, wherein:
the predetermined matter (16) comprises particulates.

1 19. The method of claim 15, wherein:
2 the tank means includes a plurality of effluent means;
3 and
4 the effluent means are cleaned without stopping fluid
flow through the tank means.

1 20. The method of claim 15, wherein:
2 the tank means includes a plurality of individual
3 compartments which are not in fluid communication with one
another.

1 21. A method of filtering fluid, comprising the steps
2 of:

3 (a) providing a tank means (30) for containing a
4 volume of fluid (21);

5 (b) introducing the fluid (21) into the tank means
6 (30);

7 (c) providing a filter media (11) for filtering
8 predetermined matter (16) out of the fluid (21);

9 (d) causing the filter media to pack relatively
10 tightly in a filter zone (19) in the tank means (30);

11 (e) flowing the fluid through the filter zone (19)
12 where predetermined matter (16) in the fluid (21) becomes
13 trapped in the filter media; and

14 (f) flowing the filtered fluid out of the tank means
(30) by allowing the filtered fluid to overflow.

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